CLAIMS:

1. A method of carrying out chemical reactions at specific temperatures, the method comprising:

applying energy to reactants in a vessel using a source other than conduction heating of the vessel or the reactants;

while concurrently cooling the vessel by conduction by contacting the exterior of the vessel with a fluid.

2. A method according to Claim 1 wherein the step of applying energy comprises exposing the vessel and reactants to electromagnetic radiation selected from the group consisting of microwaves, infrared, visible and ultraviolet radiation.

3. A method according to Claim 1 wherein the step of providing the flow of conduction fluid comprises directing a flow of air from the instrument to the vessel.

4. A method according to Claim 3 comprising directing the flow of air from a fan.

5. A method according to Claim 3 comprising directing compressed air to the vessel.

6. A method of carrying out chemical reactions, the method comprising:

applying energy to reactants in a vessel in an instrument that uses a source other than conduction heating of the vessel or the reactants to heat the reactants;

concurrently cooling the vessel in the instrument by providing a flow of conduction fluid against the vessel in the instrument;

concurrently monitoring the temperature of the vessel or its contents in the instrument;

adjusting the heating source to maintain the desired temperature at the cooling capacity that the instrument can provide to the vessel.

7. A method according to Claim 6 wherein the step of applying energy comprises exposing the vessel and reactants to electromagnetic radiation.

8. A method according to Claim 7 comprising exposing the vessel and reactants to electromagnetic radiation having frequencies selected from the group consisting of microwaves, infrared, visible and ultraviolet radiation.

9. A method according to Claim 6 wherein the step of providing the flow of conduction fluid comprises directing a flow of air from the instrument to the vessel.

10. A method according to Claim 9 comprising directing the flow of air from a fan.

11. A method according to Claim 9 comprising directing compressed air to the vessel.

12. A method according to Claim 6 wherein the step of monitoring the temperature comprises monitoring the temperature without interfering with the concurrent heating and cooling steps.

13. A method of carrying out multi-step chemical reactions, the method comprising:

applying energy to reactants in a vessel in an instrument that uses a source other than conduction heating of the vessel or the reactants to heat the reactants to a first set point;

concurrently cooling the vessel in the instrument by providing a flow of conduction fluid against the vessel in the instrument;

thereafter applying energy to the reactants in the vessel to heat the reactants to a second set point to thereby initiate a second step reaction;

concurrently cooling the vessel in the instrument by providing a flow of conduction fluid against the vessel in the instrument;

concurrently monitoring the temperature and adjusting the heat source during each step to thereby maintain the desired temperature by maximizing the microwave power at the capacity of the cooling source.

14. The method of Claim 13 further comprising the step of applying energy to the reactants in the vessel to heat the reactants to a third set point to thereby initiate a third step reaction.

15. The method of Claim 13 wherein the step of applying energy comprises exposing the vessels and reactants to electromagnetic radiation.

16. A method according to Claim 15 comprising exposing the vessel and reactants to electromagnetic radiation having frequencies selected from the group consisting of microwaves, infrared, visible, and ultraviolet radiation.

17. A method according to Claim 13 wherein the steps of providing the flow of conduction fluid comprises directing a flow of air selected from the group consisting of compressed air and air from a fan from the instrument to the vessel.

18. A method according to Claim 13 wherein said second set point is lower than said first set point.

19. A method according to Claim 14 wherein each of said set points represents a temperature different from each of said other set points.

20. A method according to Claim 13 wherein the step of monitoring the temperature comprises monitoring the temperature without interfering with the concurrent heating and cooling steps.